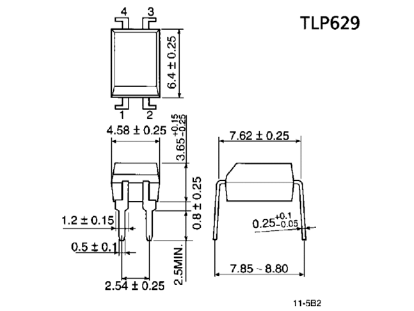
TOSHIBA Photocoupler GaAs Ired & Photo−Transistor

TLP629,TLP629−2,TLP629−4

Telecommunication
Office Machine
Telephone Use Equipment

Unit in mm

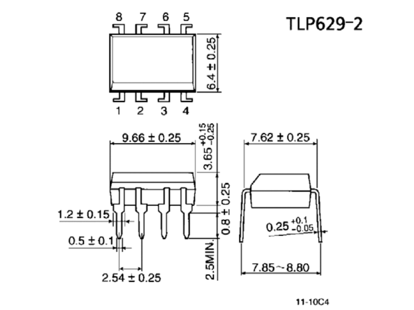


TOSHIBA	11−5B2

Weight: 0.26 g

The TOSHIBA TLP629, −2, and −4 consists of a photo−transistor optically coupled to a gallium arsenide infrared emitting diode.
The TLP629−2 offers two isolated channels in an eight lead plastic DIP, while the TLP629−4 provides four isolated channels in a sixteen plastic DIP. This is suitable for application of DC input current up to 150mA.

- I_F maximum rating: 150mA
- Collector−emitter voltage: 55V (min.)
- Current transfer ratio: 25% (min.) (I_F=20mA)
- Isolation voltage: 5000V_{rms} (min.)
- UL recognized: UL1577, file no. E67349
- BSI approved: BS EN60065:2002, certificate no.7426
  BS EN60950-1:2002, certificate no.7427

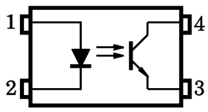


TOSHIBA	11−10C4

Weight: 0.54 g

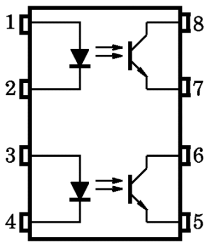
Pin Configurations (top view)

TLP629



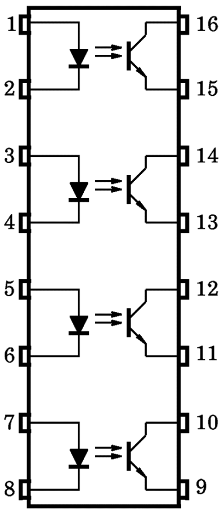
1 : ANODE
2 : CATHODE
3 : EMITTER
4 : COLLECTOR

TLP629−2

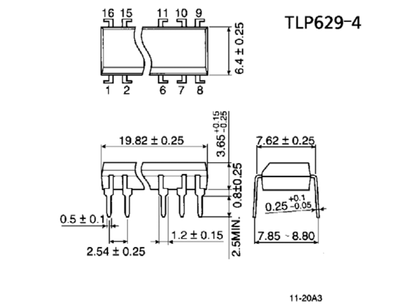


1, 3 : ANODE
2, 4 : CATHODE
5, 7 : EMITTER
6, 8 : COLLECTOR

TLP629−4



1, 3, 5, 7 : ANODE
2, 4, 6, 8 : CATHODE
9, 11, 13, 15 : EMITTER
10, 12, 14, 16 : COLLECTOR



TOSHIBA	11−20A3

Weight: 1.1 g

Absolute Maximum Ratings (Ta = 25°C)

	Characteristic	Symbol	Rating		Unit
			TLP629	TLP629−2,4	
LED	Forward current	I_F	150		mA
	Forward current derating	ΔI_F / °C	−1.5 (Ta ≥ 25°C)		mA / °C
	Pulse forward current	I_{FP}	1 (100μs pulse, 100pps)		A
	Reverse voltage	V_R	5		V
	Junction temperature	T_j	125		°C
Detector	Collector−emitter voltage	V_{CEO}	55		V
	Emitter−collector voltage	V_{ECO}	7		V
	Collector current	I_C	80		mA
	Collector power dissipation (1 circuit)	P_C	150	100	mW
	Collector power dissipation derating (1 circuit, Ta ≥ 25°C)	ΔP_C / °C	−1.5	−1.0	mW / °C
	Junction temperature	T_j	125		°C
Storage temperature range		T_{stg}	−55~125		°C
Operating temperature range		T_{opr}	−55~100		°C
Lead soldering temperature		T_{sol}	260 (10s)		°C
Total package power dissipation		P_T	250	200	mW
Total package power dissipation derating (Ta≥25°C)		ΔP_T / °C	−2.5	2.0	mW / °C
Isolation voltage (Note 1)		BV_S	5000 (AC, 1min., RH ≤ 60%)		V_{rms}

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

(Note 1) Device considered a two terminal: LED side pins shorted together, and detector side pins shorted together.

Recommended Operating Conditions

Characteristics	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	V_{CC}	—	5	24	V
Forward current	I_F	—	20	120	mA
Collector current	I_C	—	1	10	mA
Operating temperature	T_{opr}	−25	—	85	°C

Note: Recommended operating conditions are given as a design guideline to obtain expected performance of the device. Additionally, each item is an independent guideline respectively. In developing designs using this product, please confirm specified characteristics shown in this document.

Individual Electrical Characteristics (Ta = 25°C)

	Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
LED	Forward voltage	V_F	I_F = 100 mA	—	1.4	1.7	V
	Forward current	I_F	V_F = 0.7 V	—	2.5	20	μA
	Reverse current	I_R	V_R = 5 V	—	—	10	μA
	Capacitance	C_T	V = 0, f = 1 MHz	—	50	—	pF
Detector	Collector−emitter breakdown voltage	$V_{(BR)\ CEO}$	I_C = 0.5 mA	55	—	—	V
	Emitter−collector breakdown voltage	$V_{(BR)\ ECO}$	I_E = 0.1 mA	7	—	—	V
	Collector dark current	I_{CEO}	V_{CE} = 24 V	—	10	100	nA
			V_{CE} = 24 V, Ta = 85°C	—	2	50	μA
	Capacitance collector to emitter	C_{CE}	V = 0, f = 1 MHz	—	10	—	pF

Coupled Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	MIn.	Typ.	Max.	Unit
Current transfer ratio	I_C / I_F	I_F = 20 mA, V_{CE} = 1 V	25	—	—	%
	I_C / I_F (high)	I_F = 100 mA, V_{CE} = 1 V	20	—	80	
Collector−emitter saturation voltage	$V_{CE\ (sat)}$	I_C = 2.4 mA, I_F = 20 mA	—	—	0.4	V
		I_C = 2.4 mA, I_F = 100 mA	—	—	0.4	
Off−state collector current	$I_{C(off)}$	V_F = 0.7V, V_{CEO} = 24 V	—	1	1.0	μA

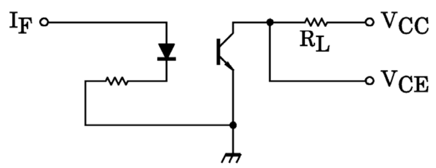
Isolation Characteristics (Ta = 25°C)

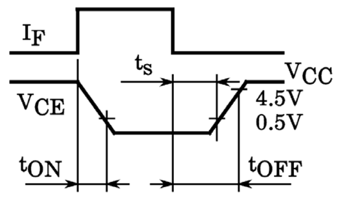
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Capacitance input to output	C_S	V_S = 0, f = 1 MHz	—	0.8	—	pF
Isolation resistance	R_S	V_S = 500 V	5×10^{10}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 1 minute	5000	—	—	V_{rms}
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	Vdc

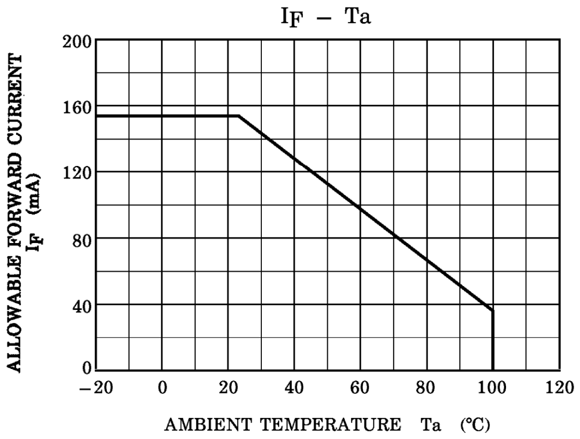
Switching Characteristics (Ta = 25°C)

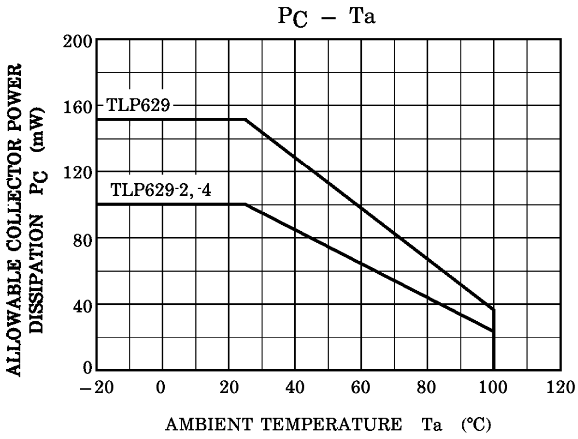
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Rise time	t_r	V_{CC} = 10 V, I_C = 2 mA R_L = 100Ω	—	2	—	μs
Fall time	t_f		—	3	—	
Turn−on time	t_{on}		—	3	10	
Turn−off time	t_{off}		—	3	10	
Turn−on time	t_{ON}	R_L = 1.9 kΩ (Fig.1) V_{CC} = 5 V, I_F = 16 mA	—	2	—	μs
Storage time	t_s		—	15	—	
Turn−off time	t_{OFF}		—	25	—	

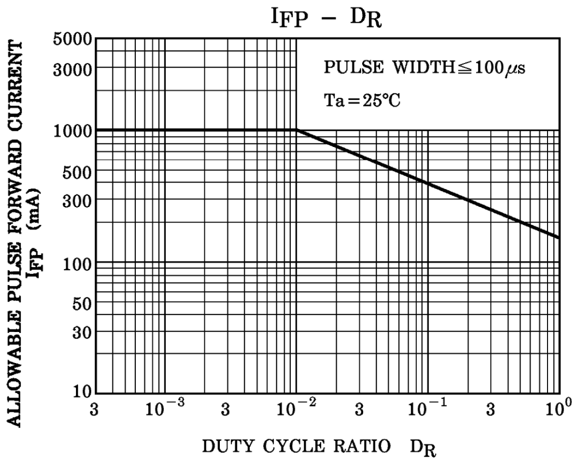
Fig. 1 Switching time test circuit

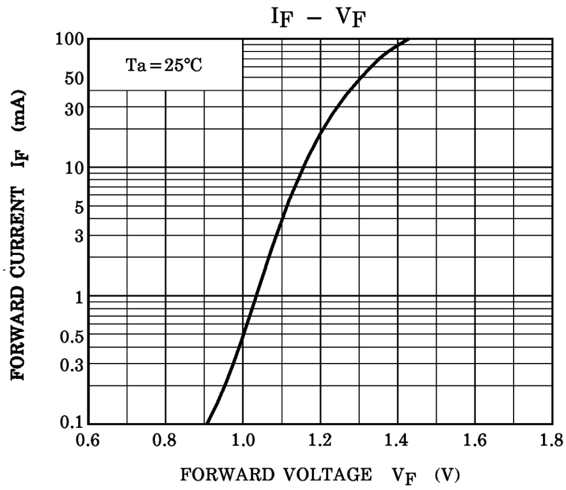


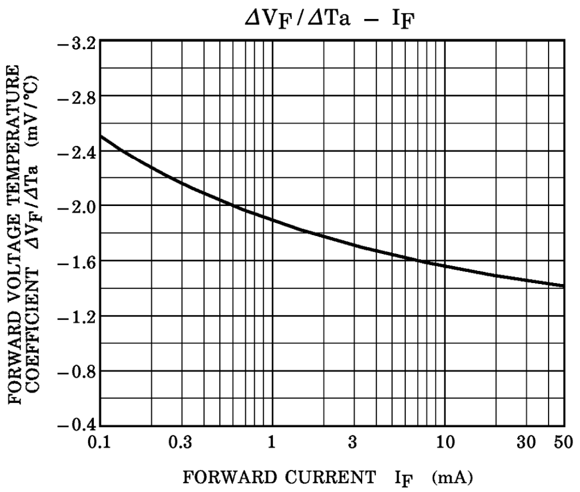


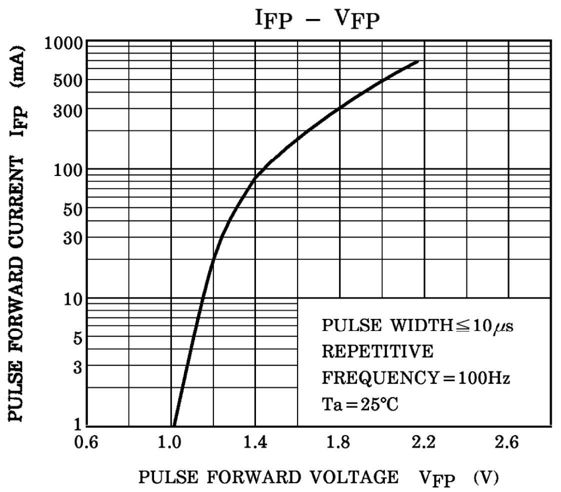

I_F – Ta
ALLOWABLE FORWARD CURRENT I_F (mA)
AMBIENT TEMPERATURE Ta (°C)

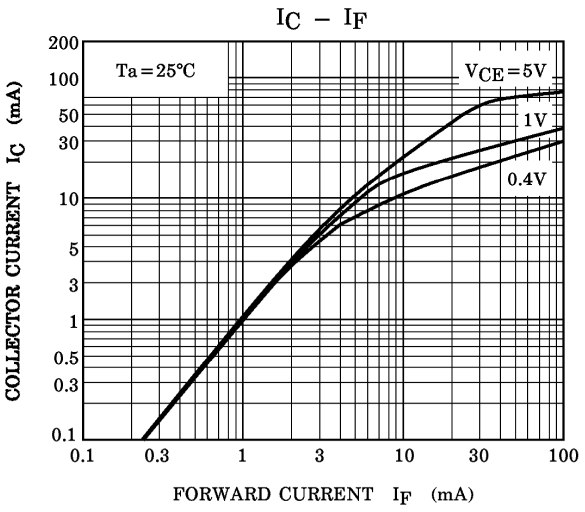

P_C – Ta
ALLOWABLE COLLECTOR POWER DISSIPATION P_C (mW)
TLP629
TLP629-2, -4
AMBIENT TEMPERATURE Ta (°C)

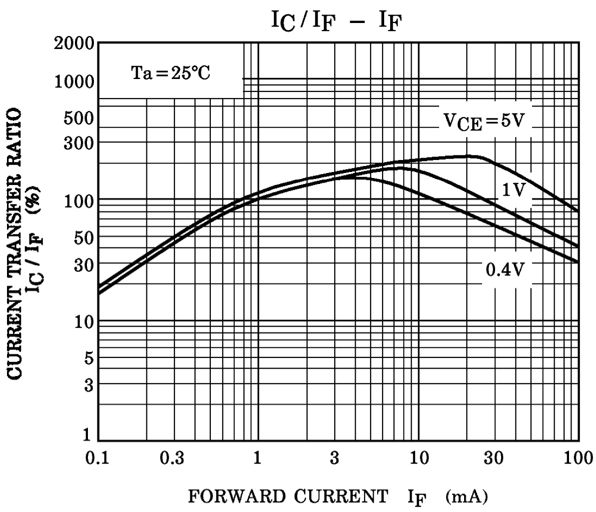

I_{FP} – D_R
ALLOWABLE PULSE FORWARD CURRENT I_{FP} (mA)
PULSE WIDTH≦100μs
Ta＝25°C
DUTY CYCLE RATIO D_R

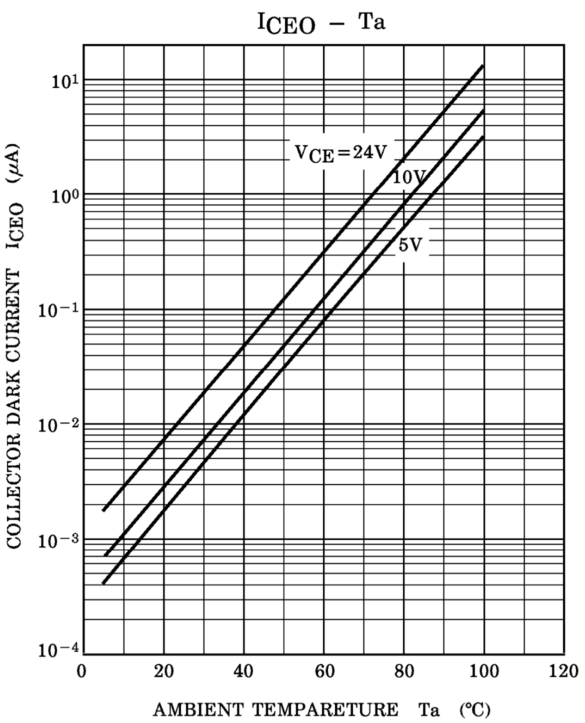

I_F – V_F
FORWARD CURRENT I_F (mA)
Ta＝25°C
FORWARD VOLTAGE V_F (V)


$\Delta V_F / \Delta Ta$ – I_F
FORWARD VOLTAGE TEMPERATURE COEFFICIENT $\Delta V_F / \Delta Ta$ (mV / °C)
FORWARD CURRENT I_F (mA)


I_{FP} – V_{FP}
PULSE FORWARD CURRENT I_{FP} (mA)
PULSE WIDTH≦10μs
REPETITIVE
FREQUENCY＝100Hz
Ta＝25°C
PULSE FORWARD VOLTAGE V_{FP} (V)


IC – IF
Ta = 25°C
VCE = 5V
1V
0.4V
COLLECTOR CURRENT IC (mA)
FORWARD CURRENT IF (mA)
200
100
50
30
10
5
3
1
0.5
0.3
0.1
0.1
0.3
1
3
10
30
100


IC / IF – IF
Ta = 25°C
VCE = 5V
1V
0.4V
CURRENT TRANSFER RATIO IC / IF (%)
FORWARD CURRENT IF (mA)
2000
1000
500
300
100
50
30
10
5
3
1
0.1
0.3
1
3
10
30
100


ICEO – Ta
VCE = 24V
10V
5V
COLLECTOR DARK CURRENT ICEO (μA)
AMBIENT TEMPARETURE Ta (°C)
10¹
10⁰
10⁻¹
10⁻²
10⁻³
10⁻⁴
0
20
40
60
80
100
120

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20070701-EN

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